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Oral health promotion and homelessness: a theory-based approach to understanding processes for implementation and adoption

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Abstract

Objective: To use the Theory of Diffusion of Innovations as a framework to explore the qualitative data gleaned from a process evaluation of the Smile4life intervention across Scottish NHS Boards, to inform future oral health promotion and homelessness.

Design: A qualitative exploration.

Setting: In 2012, the Smile4life programme to promote the oral health of homeless people was launched in Scotland. Practitioners received training to ensure its successful implementation and adoption. A process evaluation began in February 2013.

Method: Twenty oral health officers from the 11 participating NHS Boards took part in the process evaluation. They were interviewed each month for a 17-month period. Boards were placed into adoption categories based on the time taken to adoption. The data were analysed using a framework approach.

Results: The Theory of Diffusion of Innovations was used to define 'time to adoption' and to classify participating NHS Boards' adoption categories. It was also used to identify diffusion variables that underpinned Smile4life adoption. For Boards that more readily adopted Smile4life, the diffusion variables of familiarity and good social exchanges appeared to promote implementation. Numerous conflicts emerged, however, in late adoption Boards. These included a lack of resources and practitioner ambivalence, which slowed up implementation.

Conclusion: The Theory of Diffusion of Innovations provided a useful theoretical framework for understanding the processes in the implementation and adoption of the Smile4life programme. It allowed specific training requirements for the practitioners to emerge to facilitate diffusion of the programme in their Boards.

Keywords

oral health, homelessness, theory of diffusion of innovations, implementation, Scotland

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Introduction

People affected by homelessness are a diverse population, and have multiple and complex physical and psychological needs (Daly et al., 2010; Coles et al., 2011a; Scottish Government, 2013). In 2012-2013, 39,827 households in Scotland applied for homelessness assistance, with the proportion of those considered 'frontline' or 'priority homeless' – for example, having children or other dependents; being vulnerable due to age and/or illness; or being at risk from harassment or abuse – increasing by 5% between 2011 and 2013 to 30,583 (Scottish Government, 2013).

Addressing the needs of populations experiencing homelessness, the then Scottish Executive made six recommendations in their Health and Homeless Standards (Scottish Executive, 2005b). In their Dental Action Plan the Scottish Executive directed (Scottish Executive, 2005a), *"NHS Boards to develop and deliver oral health care preventive support programmes for adults in most need, such as . . . the homeless."* The Standards (Table 1) and the Dental Action Plan, thus, ensured that homeless people would be able to access mainstream healthcare services. For NHS Boards to comply with policy directives it was necessary for the Standards and the Dental Action Plan to be adopted at an organisational and practitioner level.

Table 1: The Health and Homelessness Standards (Scottish Executive, 2005)

Health and Homelessness Standards	
1	The Board's Governance systems provide a framework with which improved health outcomes for homeless people are planned, delivered and sustained.
2	The Board takes an active role, in partnership with relevant agencies, to prevent and alleviate homelessness.
3	The Board demonstrates an understanding of the profile and health needs of homeless people across the area.
4	The Board takes action to ensure homeless people have equitable access to the full range of health services.
5	The Board's services respond positively to the health needs of homeless people.
6	The Board is effectively implementing the Health and Homelessness Action Plan.

Responding to the directives of the Dental Action Plan, an oral health and psychosocial needs assessment of people experiencing homelessness was conducted (Coles et al., 2011b). Over 850 homeless people across 7 NHS Health Board areas in Scotland participated. The survey found that in this population experiencing homelessness, the oral health was poor, with high numbers of decayed and extracted teeth. High proportions of participants experienced depression of which 20% was predicted by decayed and missing teeth (Coles et al., 2011a). Four recommendations were made, mirroring the Standards. These included the promotion of oral health, integrated into national strategies and policies and implemented at local (NHS Board) and agency (Third Sector) levels¹.

By 2012, the Scottish Government launched their National Oral Health Improvement Strategy for Priority Groups (Scottish Government, 2012). Developing further the requirement for health promotion, the basis of the 'priority group strategy' was to develop a series of preventive programmes which would be evidence-based, tailored on an assessment

¹ In Scotland, the "Third Sector" refers to voluntary organisations, charities and community groups.

of need, be acceptable and accessible and provide those working within the priority group sector with appropriate training. Consequently, NHS Health Scotland was charged with developing a preventive programme for those experiencing homelessness in Scotland and the Smile4life oral health intervention was created (NHS Health Scotland, 2012).

The Smile4life intervention was introduced to all Scottish NHS Boards in June 2012. The intervention was grounded in motivational interviewing. It had three client-centred stages, related to the client's degree of willingness to change with the intervention tailored accordingly. This built-in flexibility permitted prevention and treatment to be tailored to whether the client was 'not ready to change', 'conflicted about change', or 'ready to change'. For the provider it permitted the adoption of various degrees of engagement ranging from information provider role; navigator role and advocate role. As part of the Smile4life intervention manual (NHS Health Scotland, 2012) oral health professionals and practitioners were encouraged to work with and train other colleagues including those in Third Sector organisations to assist in the promotion of oral health in their client groups.

As part of on-going work within oral health and homelessness a process evaluation of the implementation of the Smile4life intervention within the NHS Boards was undertaken. The evaluation began in February 2013 and continued over an 18-month period. All 11 NHS mainland Boards participated. Monthly telephone interviews took place with lead officers whose primary responsibility was the implementation of Smile4life programme within their NHS Boards. The telephone interviews yielded important information concerning difficulties experienced and differences in the timing of training and implementation of the Smile4life programme, however, the question arose, 'How could this information be used to understand how organisations and individuals adopt and instigate a new programme?' With regard to the NHS Board's adoption of the Smile4life programme, this question was timely since the Scottish Government had published its priority group strategy, with its emphasis on preventive programmes (Scottish Government, 2012) and the Health and Homelessness Steering Group endeavored 'to maintain progress' towards achieving their health and homelessness standards.

If an awareness of the behavioural processes involved in the adoption of new programmes, was to be achieved, it would be necessary to examine models that would provide a theoretical basis for behaviour change in health practitioners. Such a theory would need to provide a framework to examine the processes that influence how individuals adopt new behaviours while exploring how factors affect the rate of adoption within their organisations (Haider and Kreps, 2004; Angeles et al., 2014; Audrey et al., 2004). The theory of diffusion of innovations was considered suitable as it is concerned with "the process by which an innovation is communicated through [. . .] channels over time [and] among members of a social system (Rogers, 2003: 11). It provides a dynamic theoretical system in which diffusion occurs within individuals through a 5-step decision-making process, finally resulting in the adoption of the innovation. This process is affected by factors located within thematic clusters of diffusion categories. Diffusion categories, such as ambivalence, affect the communications within and between organisations, thus reducing the process of diffusion, and influencing the rate of adoption of innovations within organisations. There are five adoption categories which reflect the degree of diffusion of the innovation within the organisation; they range from 'Innovators', characterised as venturesome and ready for change; through to 'the Early Majority', characterised by ambivalence and deliberation, to 'Laggards', characterised as being late in adopting an innovation for rational reasons, such as lack of resources (Figure 1).

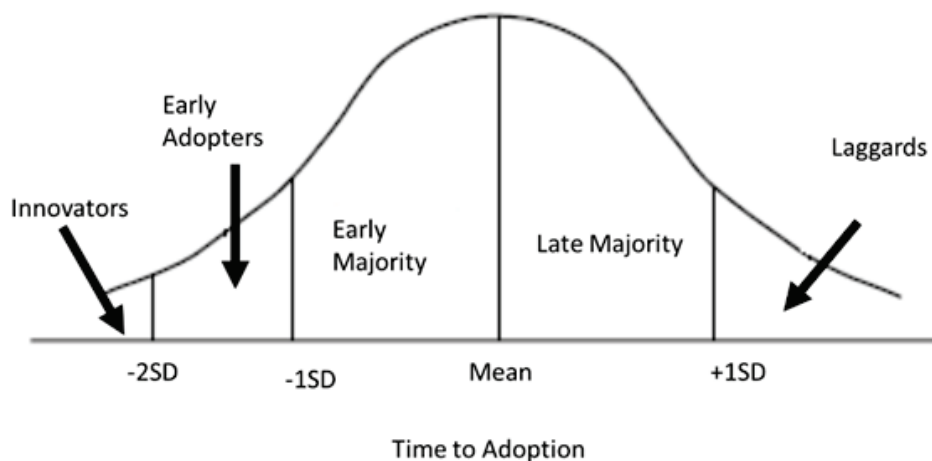


Figure 1: Distribution of adoption categories (Rogers, 2003)

The theory of diffusion of innovations was chosen, therefore, as an appropriate theoretical framework to explore how the Smile4life programme was adopted and consolidated by health practitioners within their organisations (NHS Boards) and to examine the role of factors, which enabled or inhibited the diffusion process. The aim of this qualitative exploration was to use the theory of diffusion of innovations as a framework to explore the data gleaned from a process evaluation of the Smile4life intervention across NHS Boards in Scotland, in order to inform future work in the area of oral health and homelessness.

Method

Participants

A purposive sample of 20 health and social care practitioners was recruited to take part in the process evaluation. All participants worked in oral health or health improvement services in the 11 participating NHS Boards and were lead officers for the implementation of the Smile4life programme. To ensure that there was a representative from each participating NHS Board and, in some instances, a representative for each district within the Board, participants were recruited via oral health managers and/or heads of health promotion departments. They suggested team members who acted as 'lead officers' and were directly involved with that Board's implementation of Smile4life. In five Boards, there were two participants from each Board due to maternity leave. In these Boards, the original participant recommended a colleague to participate who was involved in the Smile4life programme.

Participants were assured that their anonymity would be preserved and no identifiable information would be reported. Therefore no information will be provided regarding their gender, age group or NHS Board.

Procedure

The telephone interviews were conducted by LB, at a time suggested by the practitioners and were organised monthly over a 17-month period. Telephone interviews were chosen as the data collection method as they: provided an efficient means of communicating with participants based across Scotland; permitted "a strategy for obtaining data which allows interpersonal communication without a face-to-face meeting" (Carr and Worth, 2001: 512); and allowed participants to feel more anonymous, so encouraging them to speak openly

about potentially sensitive issues (Novick, 2008; Sturges and Hanrahan, 2004; Carr and Worth, 2001).

The interview guide included broad, open-ended questions, to encourage participants to speak freely, to share their experiences of implementing Smile4life, reasons for progress or lack of progress, current workloads etc. The interview structure was flexible so that participants' responses could be explored and new issues raised by the interviewees followed up in subsequent telephone calls. Each interview lasted approximately one hour. The interviews were audiotaped and transcribed by LB.

Ethical considerations

The Research Ethics Committee at the University of Dundee granted ethical approval (UREC 9005) for the Smile4life intervention to proceed. The National Research Ethics Service was also contacted concerning the requirement for ethical approval. The Integrated Research Application System (IRAS) responded to state that ethical approval from an NHS Research Ethics Committee was not required as the study was categorised as a service evaluation.

Prospective participants were sent an email outlining the purpose of the service evaluation, and given an information sheet, assuring confidentiality, and consent form to read, sign and return. The information sheet detailed the level of participation required: participants would agree to take part in monthly telephone interviews with LB, about Smile4life implementation in their Board. They were informed that all telephone interviews would be digitally audio-recorded and subsequently transcribed and used in report writing.

Analysis of the data

Rogers defines adoption as: "a decision to make full use of an innovation as the best course of action available" (2003: 21) Therefore, taking the NHS Boards as the unit of analysis, in this evaluation adoption emerged when the first training session was conducted within the NHS Board, alongside interactions with the Third Sector. 'Time to adoption' was therefore the length of time, in months, from the launch of Smile4life in June 2012, to the first training session in the NHS Boards, together with negotiations with the Third Sector. Each month following June 2012, the cumulative number of NHS Board adopters was plotted to provide a graphic representation of the share of implementation by Board by time.

The qualitative data were analysed using a framework approach. The transcribed data was fragmented and examined line-by-line and emerging diffusion categories were coded using the framework based on the theory of diffusion of innovations which groups the diffusion categories into three thematic clusters (Wejnert, 2002; Berwick, 2003). Thematic charts were created using the diffusion categories (Table 2) as column headings with a row for each participant and date of the interview. Summaries for each relevant part of the transcript were placed in the chart to permit the range of themes to be examined. In addition, the charts allowed the data to be re-examined over time as the interviews progressed. In particular, the charts permitted a careful examination of the diffusion categories to let the barriers and/or facilitators associated with the diffusion category to emerge.

The data was carefully trawled through independently by each of the authors for the diffusion variables in accordance with the three thematic clusters (Table 2). Once complete, LB and RF met to ensure that the analysis of the qualitative data was trustworthy and credible. In the instance where there was a disagreement the data was revisited and a consensus achieved.

Table 2: Clusters of diffusion variables

Thematic Clusters	Diffusion Variables
1. Characteristics of innovation	Benefits versus costs Compatibility with values, needs, history and beliefs Complexity of proposed innovation Triability Observability
2. Characteristics of innovators	Position in social network Familiarity with the innovation Status of innovators Personal characteristics Socioeconomic characteristics Societal entity of innovators
3. Environmental context	Geography Available resources Support Social exchanges

Results

Adopter categorisation of the NHS Boards

Figure 2a shows the Smile4life implementation share by NHS Board with time. An exponential function of the growth in innovation was best expressed by a quartic power equation, which approximates to a complex S-shaped curve, as postulated by Rogers (2003).

Figure 2a, in addition shows the change in the number of Boards adopting Smile4life occurred at specific time points, coinciding with the launch of Smile4life and when LB began the process evaluation. Therefore one Board began immediately after the launch and three more Boards started their implementation process after the process evaluation began in February 2013. The next increase in the number of Boards implementing the programme was in July 2013. This coincided with a Smile4life meeting attended by representatives of the NHS Boards. In the following two months, two more Boards adopted Smile4life. Following a lead officers' meeting in March 2014, one more Board adopted Smile4life. The adoption of Smile4life in response to the telephone interviews and the Smile4life meetings, according to Rogers' (2003) theory, would not be considered as a failure in experimental process but, rather, the interactions with LB would be considered as an additional facilitating factor in the diffusion of the innovation and characterised as a *change agent* (Rogers, 2003).

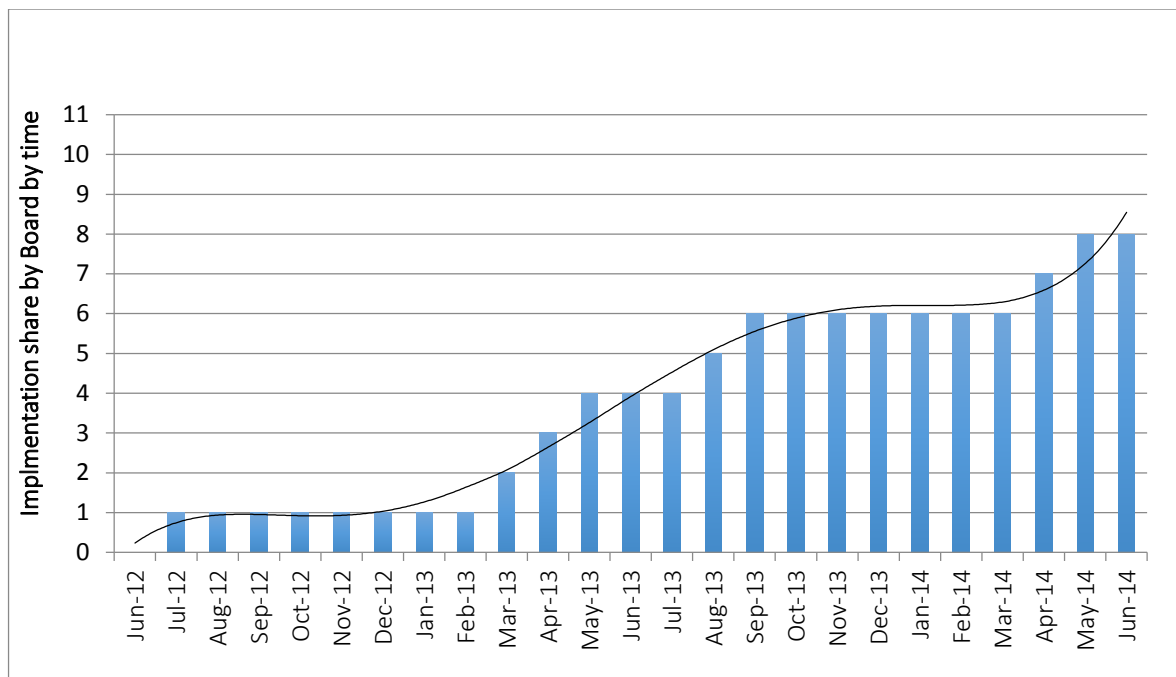


Figure 2a. Smile4life implementation share by Board with polynomial fitted curve

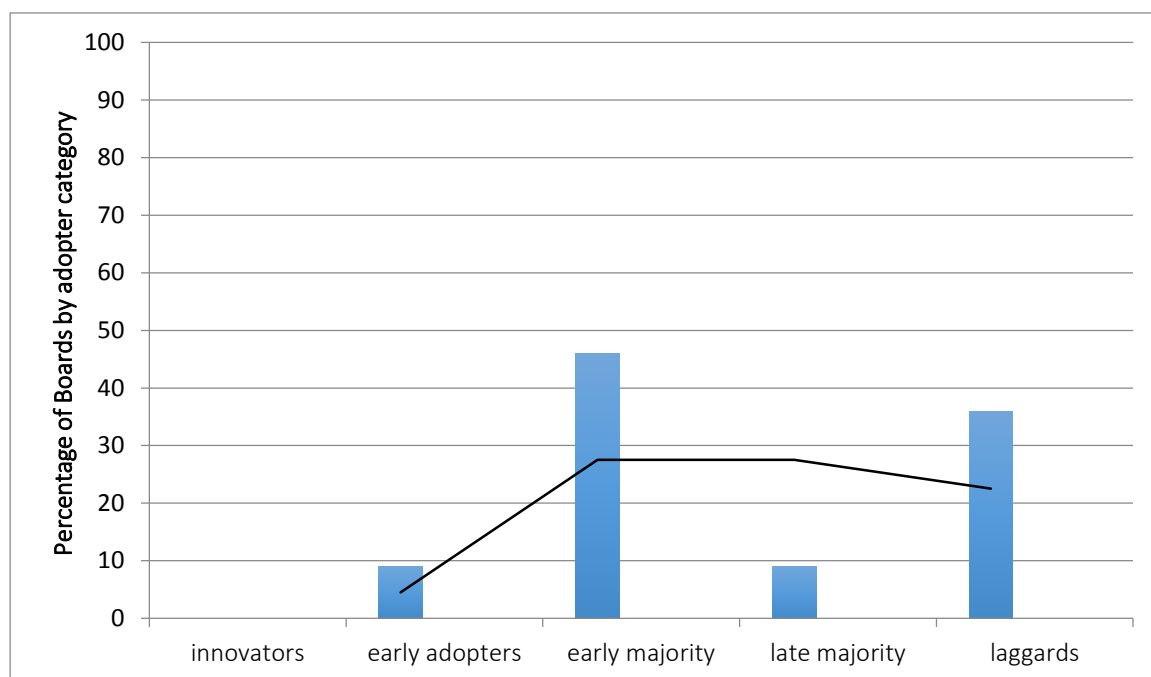


Figure 2b. Distribution of adopter categories by Board with a moving average trend line fitted

Figure 2b shows the percentage of Boards classified in accordance with the adopter categorisation as determined by Rogers (2003). Nine percent of NHS Boards were classified as Early Adopters, 46% as Early Majority, 9% as Late Majority and 36% as Laggards. According to Rogers (2003) the adoption of innovations within organisations should tend towards normality, however, when the mean and standard deviation were calculated ($\bar{x}=16$, $SD=8$), differences begin to emerge. As this evaluation elicited time series data, a moving

average was used to highlight long-term trends. The LOWESS method (Cleveland and Devlin, 1988) was used to fit a trend line to the frequency distribution data, as shown in Figure 2b, which allows evidence of a conventional bell curve to emerge, indicating that adoption is normally distributed. However, due to the incomplete adoption of Smile4life by participating NHS Boards, it is not possible to have a completed curve.

The mean and standard deviation were used to assign Boards to adopter categories, as instructed by Rogers (2003). This meant that there were no Innovators, as Rogers defines an Innovator as adopting an innovation at a time earlier than $\bar{x}-2sd$, which in this instance equates to earlier than the Smile4life launch (<0 months after launch). By categorising the Boards in this way, the percentages of Boards in each adopter category did not appear to align with those postulated by Rogers, for instance, there was a higher percentage of Laggards (36%) than Rogers proposes (16%).

NHS Board Adopter Category: Early Adopter

Board 8 was classified as an Early Adopter Board since Smile4life had been implemented and the programme consolidated, within 8 months of its launch. It emerged that Board 8's Early Adopter classification was typified by the personal characteristics of the innovators – that is, the practitioners' familiarity of working within the homelessness sector and their ability to communicate and interact with people within their organisations and within the Third Sector – thus promoting diffusion throughout these organisations.

The practitioners' familiarity and communication skills were reflected in the thematic theme of the environmental context. The practitioners' familiarity with homelessness emerged as a useful resource to promote positive partnership working between members of the NHS Board and members of the Third Sector. The practitioners' positive social exchanges in this Board acted as a resource to facilitate partnership and multidisciplinary working. The enthusiastic character of the staff, their status within the organisations, permitted a constructive exchange between NHS Boards and the Third Sector. As a result of this social exchange Third Sector staff were reported as being receptive to the implementation of Smile4life and perceived oral health as a priority health issue:

"It's been very positive... and they're always very interested in it, especially the hostels." (8a-0309)²

Practitioners' social exchanges had thus ensured that the Smile4life Programme was brought to the attention of Third Sector organisations and had assisted its implementation and consolidation across these organisations. It is proposed that social exchanges – empowered by the enthusiasm and motivation of the lead officers and their staff (characteristics of the innovators) – promoted the diffusion of the Smile4life intervention in this Early Adopter Board. Furthermore, it is postulated that in this Early Adopter Board, the importance of the thematic clusters - environmental context and the character of the innovators - outweighed any ambivalence relating to the characteristics of the intervention, such as time needed for implementation. The practitioners' social exchanges ensured that the Smile4life intervention was implemented throughout the Board and became integrated as part of the work of Third Sector organisations. Thus as a consequence of familiarity,

² The first part of the number assigned to quotations indicates the NHS Board the speaker is from. A letter is included if there was more than one speaker per NHS Board. The four-digit number indicates the date on which the interview took place.

powered by positive social exchanges, diffusion of the innovation occurred and permitted supportive and multidisciplinary working within and between the Board and the Third Sector to emanate from within this Early Adopter Board:

“(We’ve) all found it smooth sailing as well... it’s been very well received... No people saying ‘oh, that’s not my job’”. (8b-0206)

NHS Board Adopter Category: Early Majority

NHS Boards 5, 6, 7, 10 and 11 implemented and showed signs of consolidation of the Smile4life intervention between 8 to 16 months after its launch. Thus they were classified as the Early Majority (Rogers, 2003). In contrast to the Early Adopter Board, the characterisation of the innovation (i.e. the content of Smile4life programme) and the environmental context (e.g. social exchanges) in which the adoption took place, appeared to have disempowered practitioners, reduced diffusion and thus delayed the implementation of the Smile4life programme in NHS Boards 5, 6, 7, 10 and 11.

It emerged that the decision, as to when to implement Smile4life, was affected by a degree of ambivalence and subsequent deliberations about resources and support. A careful examination of the data supported this reflection, since the diffusion category, ‘familiarity’, appeared to influence the timing of the implementation of Smile4life within Early Majority Boards. However, familiarity emerged with a degree of ambiguity since it acted as both a barrier and a facilitator regarding diffusion of the innovation. Some Early Majority Boards, (e.g. Board 5), were quicker in their implementation and consolidation of the Smile4life programme and spoke of organising Smile4life training with:

“local councils, and the YMCA and the Salvation Army ... they are all keen to come along.” (5-1903)

In Boards 6 and 11, participants also spoke of their successful experiences of working in the homelessness sector, about feeling comfortable in the knowledge that using motivational interviewing could work and spoke of their existing links (positive social exchanges) with local homelessness centres and hostels, with whom they interacted:

“We do have such strong links... we’ve been working on a more ad hoc basis with the centres and temporary accommodation sites for so long that people know us, we’ve built up a good relationship.” (6a-2003).

Familiarity and social exchange, however, emerged as precarious facilitators of the innovation, in some Early Majority Boards, since they were overwhelmed by unhappy experiences interacting and working in the homelessness sector:

“The homeless prevention officer wasn’t particularly interested... he wasn’t dismissive.” (10c-1212).

Early Majority Boards, such as Board 11, thus delayed their implementation of Smile4life, as a consequence of previous experiences which had resulted in an abrupt ending of services:

“There was a homeless team... that directed them to all the medical services and appropriate services. The homeless team, were giving appointments for the homeless dental service ... no one was turning up, so they’re not running that service now.” (11b-1405)

In Early Majority Boards, where familiarity acted as a barrier, lack of resources exacerbated the ambivalence surrounding implementation. Emerging from the environmental context thematic cluster, lack of resources included reduced “*staffing capacity*” (6a-2003), lack of funding, finding time and competing priorities. Aggravated by their extensive workloads, participants reported that they did not have enough time to complete their current work, let alone implement Smile4life. Being overwhelmed by their own workloads, some practitioners’ felt sure that those working in the Third Sector were similarly affected, since:

“The staff don’t feel it’s relevant to them.” (7a-2405).

This led practitioners, such as those in Board 10, to voice their reluctance to engage with Third Sector organisations:

“They are so short-staffed, sometimes they’ve even got like one or two staff on in a shift.” (10a-0402): “It’s not going to be a high priority for the hostels.” (10a-0803)

As participants voiced their concerns about not being confident to use or train people, some also stated that motivational interviewing was inappropriate for the homelessness sector. After all, Smile4life was incompatible with their current service needs, Smile4life was, “*another challenge looming up*” (10c -0703) and Smile4life was a burden taking time for working with more worthy groups. However, while some practitioners felt that on the one hand, the content of the Smile4life programme was too complex and too difficult, they were, at the same time:

“Very motivated to take things like this forward.” (7a-2405).

This flavour of ambivalence and conflict, fuelled by familiarity and lack of resources, pervaded the Early Majority Boards. The degree of practitioner ambivalence, therefore, influenced the Board’s timely implementation and consolidation of the Smile4life programme together with their engagement with the Third Sector.

NHS Board Adopter Category: Late Majority

Only Board 4 was classified within the Late Majority category, since practitioners had waited 20 months after the Smile4life launch to adopt and consolidate the innovation. The issues that emerged as barriers to diffusion mirrored the challenges faced by the Early Majority Boards, however, while the Early Adopter Boards were characterised by ambivalence and deliberation, this Late Majority Board was consumed by the opinion that Smile4life was too complex (characteristics of the innovation), homeless people and those in the Third Sector were disinterested. These opinions were upheld without question.

Therefore, although Board 4 had experience working in the homelessness sector, this had not aided the adoption of Smile4life and familiarity only served to support the practitioners' negative perceptions about working with homeless people and those within the Third Sector. The following two quotes are illustrative:

"We tried to run a drop-in centre... but found there wasn't uptake enough to justify the staff input." (4b-2504)

"Training has been cancelled as the Third Sector staff - felt they were too busy to take on the training and the work." (4c-2604)

While practitioners spoke of Smile4life as being 'too complex', it emerged that their reproaches were aggravated by their concerns of how to find or identify homeless people who would benefit from the intervention:

"I think probably the key challenge is just getting to the groups that we need to." (4a-1005).

An additional issue concerned how to interact and engage with Third Sector practitioners who they feared would be irritated by their approaches:

"She felt that as she was talking to (hostel staff) they got less and less interested about dental health, as the conversation went on." (4a-1411)

It emerged, therefore, that Board 4 while at first appearing to be disaffected regarding the adoption and consolidation of the Smile4life intervention, found that this disaffection screened their fears of how to engage with homeless clients and those working within the Third Sector. Consequently, their concerns about the complexity of the intervention, how to identify homeless clients and engage with the Third Sector outweighed the recognised benefits of Smile4life. The difficulties expressed by the practitioners working in Board 4 may be explained in terms of the Health Belief Model in which the benefits of behaviour change are dispelled by the barriers to change (Angeles et al, 2014). We propose that for this Late Majority Board their forward movement was inhibited by their fears and concerns of failure to engage with client groups and the Third Sector.

NHS Board Adopter Category: Laggard Boards

Boards 1, 2, 3 and 9 were conceptualised as Laggards. At 24 months after the launch of Smile4life they still had not implemented the programme. It emerged that the diffusion categories influencing the mere introduction of the programme for these Laggard Boards were located in the characteristics of the innovation and the environmental context. While the views of complexity of the innovation, together with concerns of partnership working, pervaded the opinion of the worthiness of the programme, it seemed that for Laggard Boards the predominate barrier to diffusion was geography. For instance, Boards 3 and 9 were based in remote-rural localities. Practitioners working in these Boards were unaware of the number of homeless people or centres where engagement could take place. As a practitioner working in Board 3 stated:

"I'm from a very rural area, and we don't really have any homelessness centres." (3-2502)

Therefore, it appeared that the practitioners' felt they had little time for another intervention and they believed that the Smile4life programme was too cumbersome to introduce in an environment where there was little interest in dental health. However a more careful examination of the data allowed the remote-rural working environment to emerge as the greatest threat to diffusion. The following is illustrative. Practitioners working in more urban areas spoke of forging engagement with colleagues from health and homelessness groups:

"We're in good contact with the homelessness service and they will use us if they need us." (3-2502)

Others, in more remote localities, commented upon being caught in a training-implementation vortex where they had provided training but the implementation had been stalled:

"We've got care homes who are actually doing the training but they're not actually getting on with implementing it, and so we're having to revisit that to see why that's happening." (1-2404)

Such training and implementation experiences were a common occurrence especially for those practitioners working in remote and rural areas – the consequence being that it was all, *"a bit much sometimes"*. (2-3005).

The remote-rural locality, was therefore, conceptualised as a threatening factor in which any slight implementation difficulty was exacerbated by geography – or as one practitioner noted:

"I think it is a challenge because you have to do a fair bit of work before you even start." (10c-1212)

Furthermore an additional burden of remote-rural working emerged but this time as practitioner frustration:

"I just find it's very frustrating to get the actual time to do all of these things" (9-1107)
"You feel like you're spinning so many plates, that you just can't possibly keep them all up in the air." (9-1107)

As the idea of 'spinning plates' was unpacked, it became possible to understand the effect of geography upon the diffusion of Smile4life. Gradually it emerged that the practitioners had appreciated the importance of the Smile4life programme but the difficulties in adoption and consolidation they experienced were related to geography and their working environment. As a result they prioritised and thought carefully of what was possible and what was impossible within the constraints of their work setting. In this respect, these findings reflect the view of Rogers (2003) – that being classified as a Laggard

should not automatically justify a negative connotation - since for some Laggards it is the role of diffusion categories within the environmental context, which dilutes their determination to implement an intervention, rather than that of the innovation or characteristics of the practitioners. Such factors as these must be taken into account when considering the implementation of new innovations in remote-rural settings.

Discussion

The aim of this qualitative exploration was to use the Theory of Diffusion of Innovations as a framework to explore the data gleaned from a process evaluation of the Smile4life intervention across NHS Boards in Scotland, in order to inform future work in the area of oral health and homelessness. The Theory of Diffusion of Innovations was chosen as it had been shown to be useful in providing a theoretical basis for the processes involved in the spread and implementation of innovations within and between organisations (Gainforth et al., 2014; Audrey et al., 2004; Haider and Kreps, 2004).

The findings suggested that the practitioners' utterances, together with the timely adoption and consolidation of the Smile4life programme, could be explained by the Theory of Diffusion of Innovations. Furthermore, any untoward effect of the process evaluation was reflected in the idea that this communicative interaction acted as an agent of change. A small number of diffusion categories underpinned the adoption of this innovation across the various adopter groups. The differences, however, in the degree of ambivalence and deliberations concerning, for example, the content of the programme, previous experiences of engagement and partnership working appeared to affect timeliness of the implementation of the Smile4life programme within and between each of the adopter groups. This was particularly noticeable in the Early Majority Boards in which the diffusion category 'familiarity' emerged with ambiguity – acting as a facilitator for diffusion in some instances and as a barrier for diffusion in others.

Moreover, it appeared that the diffusion categories acted in unison affecting the implementation of the programme. In the Late Majority Board, for example, the negative perceptions concerning working with homeless people and the Third Sector, acted together to reduce the practitioners' willingness to implement the innovation. However, this negativity camouflaged the fears and worries the practitioners had about how to identify clients and how to engage with colleagues. While the trigger for change was Scottish Government policy, the emerging feeling that the costs outweighed the benefits of adopting the innovation is supported here. The role of geography also acted to reduce the determination of practitioners within Laggard Boards. Experiences associated with working in more remote-rural areas compared with more urban settings impacted upon their willingness to train and implement health promotion packages. Some practitioners working in more remote-rural localities stated that they felt that the number of people experiencing homelessness in their area was too low and too dispersed to justify the implementation of Smile4life. Therefore, it may be suggested that these practitioners were aware of the geographical impacts and these appeared to influence their resolve prior to implementing any new intervention or health promotion programme.

Therefore it seemed appropriate to suggest that within any one of the adopter groups differences existed between the Boards, suggesting that a complexity existed within organisations and their communicative processes. This suggestion is supported by Lyytinen and Damsgaard (2001). They propose that there is a need to understand the complexity of communication networks and 'institutional regimes' as important processes when

innovations are diffused to other colleagues and organisations. We propose that an additional factor in the communication network is geography, reinforcing Rogers' (2003) belief that "space is important in determining the adoption of an innovation."

Angeles et al (2014) have re-examined the Theory of the Diffusion of Innovations and have suggested that the diffusion categories may be thought of in terms of process components, organisational components and contextual components. These authors postulate that it is an understanding of the complexity of interventions, like Smile4life, together with the various components involved in its adoption and consolidation that will allow structures to emerge to facilitate diffusion of an innovation.

We propose that this alternative classification, together with the characterisation of the adopter groups, permits training of practitioners from within Boards to be tailored to their process component needs (e.g. resources for implementation released), organisational component needs (e.g. strategies for partnership working) and the contextual component need (e.g. strategies for training colleagues when working in remote-rural areas). We suggest that the findings of the process evaluation using the Theory of Diffusion of Innovations has allowed the emergence of the need for specific training in innovations, tailored to the needs of practitioners within their adopter group categories. Indeed, future research could use the Theory of Diffusion of Innovations to tailor training, by highlighting suitable 'opinion leaders' (Rogers, 2003), to act as champions or provide peer support, as noted in the successful health promotion intervention reported by Audrey et al. (2004).

It may be suggested that the process evaluation acted to disrupt the timeliness and spread of the Smile4life programme. However, it would seem that, according to this theory, the process evaluation acted as an agent of change, placing Smile4life on the agenda for Boards. For the majority of Boards, the process evaluation provided opportunities for communication between oral health staff involved in the intervention. This inter-network communication, associated with the 'mobilisation' and uptake of research findings (Gainforth et al., 2014), acted as a similar facilitator with Smile4life, allowing practitioners to compare approaches and share best practice, within, and between, NHS Boards.

While telephone interviews were chosen because of their suitability for collecting the qualitative data from a participant group widely located across Scotland, this method could have had some limitations. For instance, by not being face-to-face with the person being interviewed, visual cues may have been missed, which could affect the interpretation of responses (Novick, 2008). However, the relative anonymity provided by telephone interviews allowed the practitioners to be open and honest about their experiences and be negative about the intervention.

One hundred and three interviews took place over the 17 month data collection period. The frequency of interviews was dependent on the availability of the participants, and as such, although all Boards were contacted on a monthly basis by LB, for some, interviews took place approximately every eight weeks. The average number of interviews per location was 7. This does not represent the average number of interviews per participant, as there were staff changes due to maternity leave. Towards the end of the evaluation period, some participants considered their direct involvement in Smile4life to be over because they had implemented Smile4life as much as possible in their area. Others, in Laggard Boards, dropped out because there was so little progress on implementation. However, although taking part in the process evaluation was perceived as an additional challenge for some participants in, for example, Laggard Boards, who were already struggling with time constraints and heavy

workloads, the telephone interviews elicited valuable information regarding the conflicts and motivations that affected Smile4life implementation.

Therefore, there are implications for the implementation of such community-based health promotion interventions. Using the Smile4life intervention, it may be proposed that to encourage the diffusion of the Smile4life innovation, it is necessary to tackle and overcome the conflicts experienced at the individual staff, the Board, and the Third Sector levels. It may be suggested, for example, that the external barriers, such as geography or resistance from the Third Sector must be explored to uncover concerns regarding the perception that oral health was not compatible with the needs of the client group. It is necessary to continue to promote Smile4life and highlight the needs of people experiencing homelessness in Scotland. To do this, it is crucial that engagement is sought with the Third Sector and local authority staff, to improve partnership working, as well as ensuring that oral health and homelessness is a priority for all health and social care practitioners across Scotland.

Therefore, it is suggested that the Theory of Diffusion of Innovations provided a theoretical framework to understand the adoption and consolidation of the Smile4life programme in NHS Boards in Scotland. Moreover, it allowed the emergence of the need for specific training in the implementation, adoption and consolidation of interventions, to be tailored to the needs of practitioners within the adopter group categories.

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